December 2, 2013

MEMORANDUM TO: Brian W. Sheron, Director
Office of Nuclear Regulatory Research

FROM: Sunil D. Weerakkody, Chairman ***/RA/***
Panel for Review of Pre-Generic Issue Screening Evaluation
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: RESULTS OF SCREENING OF PROPOSED GENERIC ISSUE PRE-GI-0001, "MULTIUNIT CORE DAMAGE EVENTS"

In accordance with Management Directive (MD) 6.4, "Generic Issues Program," the screening panel completed its review of Pre-Generic Issue (Pre-GI)-0001, "Multiunit Core Damage Events." A potential safety concern was identified during the sequence identification and selection process for the State-of-the-Art Reactor Consequence Analysis (SOARCA) project for the Surry and Peach Bottom plants. Staff working on the SOARCA project identified scenarios in which both units at each plant would be expected to experience accident sequence progression pathways leading to core damage as a result of the initiating event.

These scenarios had core damage frequencies in the range of 10^{-6} per year. This frequency is low in an absolute sense, but it is in the range of other scenarios being evaluated in probabilistic risk assessment (PRA) studies. This topic was proposed as a Generic Issue because such multiunit core damage sequences may challenge the ability of the plant operating personnel to respond and may require resources (technical staff and equipment) beyond that which are available for single unit scenarios. Multiunit core damage scenarios may also increase the radionuclide releases and offsite consequences.

Current licensing policy and practice considers each plant individually; that is, a single license is not obtained for a site composed of multiple plants. There are currently 35 sites with multiple nuclear units and there are applications for new units at existing sites. The first necessary step to determine whether actions and policy changes may be warranted is to quantify and better understand the risk or safety significance of multiunit scenarios. This entails the development of appropriate risk tools, such as multiunit PRA models. During the screening of this issue, the March 2011 accident at Fukushima Dai-ichi in Japan occurred, further underscoring the importance of better understanding and quantification of multiunit risk.

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The panel also notes that post-Fukushima, the NRC determined that U.S. plants are safe for continued operation. In addition, as described in SECY-12-0095, "Tier 3 Program Plans and 6- Month Status Update in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Subsequent Tsunami" numerous actions, such as orders and requests for information, are in progress which will enhance the resources (equipment, procedures, and emergency response staffing) available to respond to a multiunit event; thus reducing multiunit risk.

The screening panel considered whether interim regulatory actions were warranted due to the safety significance of the questions raised, noting that NRC research is currently being conducted to better understand multiunit risk, but that this work will take several years to complete. RES staff explored this question using a form of notional risk analysis (i.e. high level, simplified) for sites with multiple reactors. This analysis is provided in Enclosure 1. Notional analyses such as this cannot render detailed insights into multi-unit site risk, due to the many simplifying assumptions, site-to-site variability of actual environmental hazards, and the specific extent of shared or inter-connected systems between reactor units. Understanding the dependencies between multiple units on a site -- internal, external, and operational -- and their effect on overall site risk can only be understood by modeling these dependencies in a comprehensive and integrated site-specific PRA model. However, the enclosed notional evaluation suggests that multiunit risk is low and that interim regulatory actions are not warranted. Information on the regulatory background and history of multiunit risk is provided in Enclosure 2.

The screening panel recommends that this issue exit the Generic Issue (GI) Program because of the estimates of low risk significance and because it will require longer term efforts to develop the tools to fully and accurately quantify multiunit risk, i.e., more than the six months prescribed by Management Directive 6.4, "Generic Issues Program." Accordingly, this proposed GI does not meet the first and the fifth of seven criteria required for designation as a GI. The first criterion states that the issue must affect public health and safety, which includes a risk significance component. The fifth criterion states that an issue's risk or safety significance can be adequately determined, i.e., does not require longer term studies to evaluate.

Should future insights into multi-unit site risk suggest the need to re-examine this conclusion, the matter may be returned to the Generic Issues Program for evaluation in accordance with the normal program procedures.

Enclosure:
1. A Scoping Estimate of Nuclear Power Plant Site Risk
2. Regulatory Background on Multiunit Risk

Approved: ***/RA/*** Date: 12/2/13

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